



City of Tualatin

Industry Cluster Analysis

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Executive Summary

The City of Tualatin conducted an industry cluster analysis to identify correlated firms that possess a competitive regional advantage. The analysis used pre-established cluster definitions developed by the U.S. Cluster Mapping Project. The U.S. Cluster Mapping Project separates clusters into local and traded industries. A local industry cluster produces goods or services that primarily meet the needs of the people within the region; while traded industry cluster's products and services are primarily exported out of the region. This analysis focused solely on traded clusters as these clusters bring in new wealth into the regional economy.

Data Sources

This analysis utilized the economic modeling software EMSI (Economic Modeling Specialist, Inc.) that aggregated data from the Oregon Employment Department, United States Bureau of Economic Analysis and United States Census Bureau.

Methodology

Candidate traded industry clusters were identified utilizing baseline screening criteria of location quotient analysis, differential shift analysis, and number of establishments within a cluster. The candidate clusters were then placed in an industry concentration and competitive diagram focused on growing base, emerging, mature and transforming firms. Once the initial candidate traded clusters were identified, a strength analysis was conducted utilizing basic employment, projected employment, and wage comparison-growth-competiveness factors.

Findings

The Tualatin Region was found to have a significant *growing base* of six industry clusters

- Advanced Manufacturing
- Distribution and Electronic Commerce
- Food Processing and Manufacturing
- Information Technology and Analytical Instruments
- Furniture
- Plastics

In addition, to a strong competitive growing base segment, one industry cluster was identified as an *emerging cluster*:

- Business Services

These identified traded industrial clusters represent 35% of total employment in the City of Tualatin generating 45% of our local gross product at \$1.9 billion dollars. Moving forward, the City of Tualatin intends to conduct a detailed business health and workforce analyses in efforts to retain and expand identified firms within these clusters.

OVERVIEW

What is a Cluster?

Generally accepted views of industry cluster theory holds that establishments belonging to an identified cluster enjoy competitive advantages. Stemming from improved productivity or reduced costs because member firms access the same resources of specialized suppliers, labor, information, and infrastructure all of which is facilitated by their geographical proximity. The terms “industry cluster,” “business cluster,” “competitive cluster,” or “cluster” are often used interchangeably as there is no official guideline or standardize approach to define or identify an industry cluster. The formation and performance of clusters are dependent not only on the individual performance of companies but also on the business environment set by anchor institutions and government and regulatory agencies.

Local Clusters versus Traded Clusters

This analysis uses pre-established cluster definitions developed by the U.S. Cluster Mapping Project, an initiative led by the Institute for Strategy and Competitiveness at the Harvard University Business School and supported by the United States Department of Commerce Economic Development Administration.

The U.S. Cluster Mapping Project separates all industries into two types: local industries and traded industries. A local industry firm produces goods or services that primarily meets the needs of the people within the region. A traded industry firm is typically concentrated in a specific area that produces goods and/or services that are exported outside the local trade area.¹

This report focuses solely, with the inclusion of healthcare and a combined advanced manufacturing supercluster, on traded industries organized by traded cluster definitions as provided by the U.S. Cluster Mapping Project. These industries typically command higher wages and rates of innovation than do local industries and are generally considered “engines of the local economy.”

Total traded industries in Tualatin represent 43% of total employment, exceeding the national average of 36%. In addition to total employment, traded industries (with the addition of healthcare) account for nearly 74% of the local gross product equating to nearly \$2.7 billion dollars.

¹ U.S. Cluster Mapping Project. (2018). Glossary of Terms. <http://www.clustermapping.us/content/glossary-terms>. Delgado, M., M.E. Porter, and S. Stern (2014), “Defining Clusters of Related Industries.”*

Region Defined

The identified area that is presented in this analysis is the United State Postal Zip Code 97062. This area will be commonly referred to as Tualatin.

Analysis Platform and Sources of Data

This analysis utilizes the economic modeling software EMSI (Economic Modeling Specialists, Inc.) to acquire industry, employment, and occupational data, as well as economic input-output modeling. EMSI combines employment and establishment data from the Quarterly Census of Employment and Wages (QCEW) produced by the Oregon Employment Department with data from the Regional Economic Information System (REIS) published by the United States Bureau of Economic Analysis (BEA) and augmented with County Business Patterns (CMP) and Non-employer Statistics (NES) published by the United States Census Bureau.

Number of industry cluster establishments are provided by the Oregon Employment Department based on the most recent data from the year 2016.

Criteria Overview

The initial steps of identifying candidate clusters focuses on three initial base measures: location quotient, differential shift, and critical concentration. These criteria measurements are the most commonly used to identify the presence of industrial clusters within selected regions. Once candidate clusters are identified using initial base measurements, clusters are then analyzed on their strength and importance to the local economy. Strength criteria include: basic employment, projected employment, wage comparison, and wage growth and competitiveness.

SCREENING CRITERIA

Location Quotient

A region will specialize in industries in which it is more competitive – yielding concentrations of employment in those sectors. The location quotient theory holds that if an industry employs more workers than the national average, the industry is producing more goods and services that the local region can absorb thus exporting the excess product/service out of the region. The location quotient is a formula used to identify the concentration of an industry sector using the ratio share of employment in the identified local cluster compared to a larger area – typically the nation. The location quotient is a static measure, picturing the economy at only point in time. It does not reference if an industry is growing or declining in importance to the local economy.

The location quotient is shown as a ratio between the percentages of employment in an industry locally to the percentage of employment in the same industry found in the larger comparative economy.

A location quotient (LQ) greater than one (1.0) indicates an industry that is more concentrated and specialized than the larger comparative region. An industry with a 1.0 LQ reflects an industry that has met the local economy's need for the product and service. An industry that has an LQ greater than one (1.0) has met the needs of the local economy and is subsequently

exporting all or part of its product out of the local region effectively adding economic stimulus and greater growth potential to the regional economy.

The standard formula representing the location quotient is as follows:

$$LQ = \frac{\left(\frac{e_i}{e}\right)}{\left(\frac{E_i}{E}\right)}$$

e_i = local employment in the industry i

e = total local employment

E_i = national employment in industry i

E = total national employment

For this report, industry clusters with a LQ of 1.25 and greater will be considered true export clusters. Utilizing a higher LQ will assist in eliminating the variations that may exist with utilizing LQ 1.0 due to the unclear veracity of baseline assumptions for area productivity compared to the national average.

Differential Shift

Under certain conditions, if an industry is more competitive regionally than nationally, then its employment will likely grow faster than the industry's national rate. Economic growth in a local community benefits or suffers from the changes in the overall regional, state, and national economies. Irrespective of which industry, the overall economy has a direct impact on local production of goods and services. Unlike the location quotient, differential shift measures the economy over a given time.

The *differential shift or competitive advantage* is the difference in the rate of growth or decline in a local industry relative to the rate of growth or decline in the same industry nationally. Local industries can have competitive advantages if those industries are declining less rapidly in nationally declining industries, or growing faster than the nationally growing industries.

Differential Shift can be expressed as:

$$\left[\left(\frac{locCY_i}{locBY_i} \right) - \left(\frac{empCY_i}{empBY_i} \right) \right]$$

$empCY_i$ = Current year employment in industry i in the reference economy

$empBY_i$ = Base year employment in industry i in the reference economy

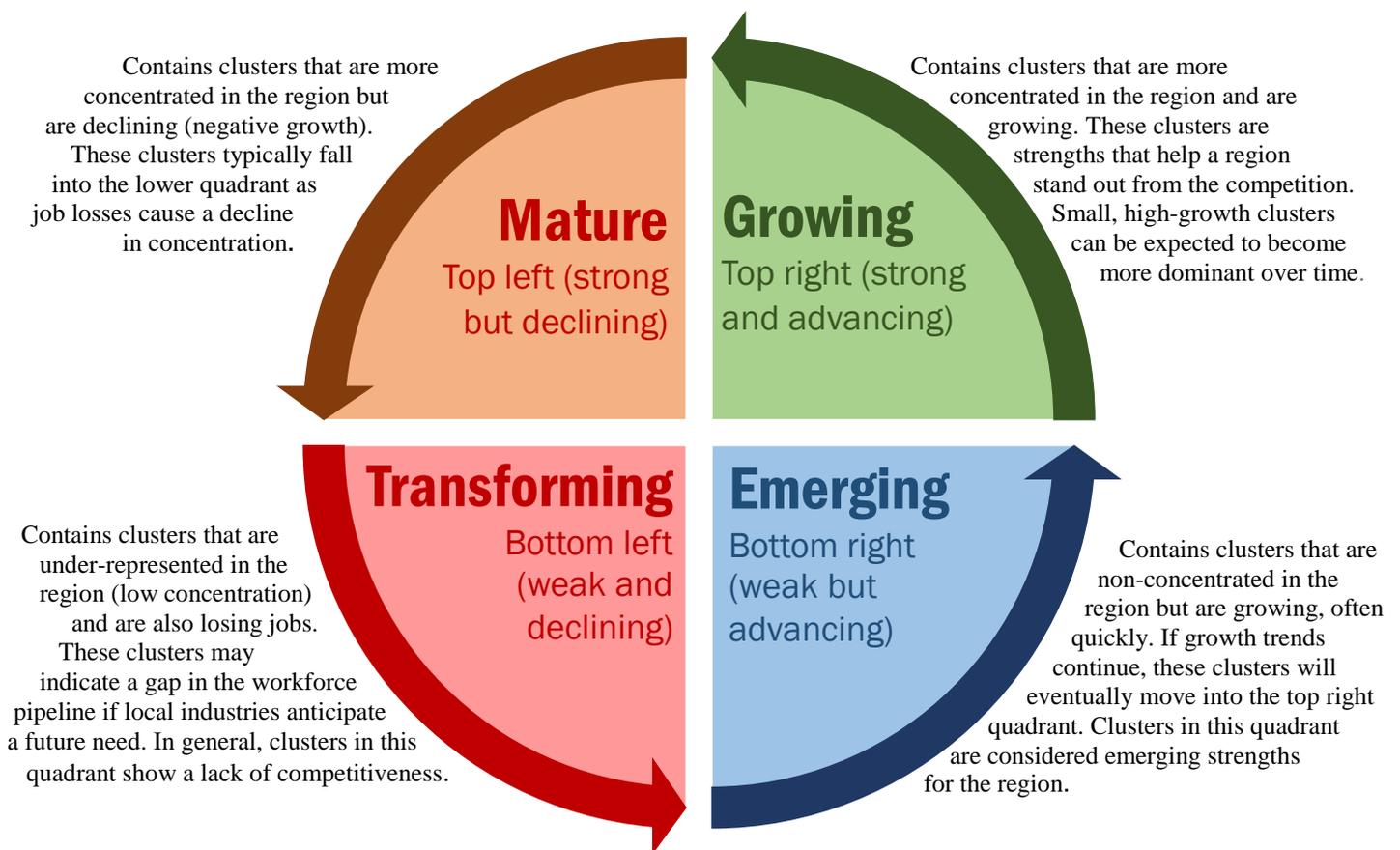
$locCY_i$ = Current year employment in industry i in the local economy

$locBY_i$ = Base year employment in industry i in the local economy

Taken together, an industry's location quotient and differential shift will place it in one of four categories, or quadrants, on a graph. Industries in the "growing base" quadrant demonstrate

evidence of relatively strong employment concentration ($LQ > 1$) and a growing local shift of employment ($DS > 0$). Clusters located in this quadrant are the most likely candidates for targeted efforts of business attraction with potential efforts of expansion. “Emerging” clusters have lower concentrations ($LQ < 1$) and growing competitive advantage ($DS > 0$), and may have the potential to move into the growing base quadrant with continued growth. “Mature” quadrant clusters are regionally concentrated ($LQ > 1$) and may have been competitive and specialized in the past but are losing employment at a greater rate than the national level ($DS < 0$.) Establishments in these clusters maybe relocating, downsizing, or closing. “Transforming” clusters are both losing employment ($DS < 0$) and have low employment concentrations ($LQ < 1$). *Mature and Transforming Clusters* will not be considered as candidate clusters for this analysis.

Graph 1. Quadrant of Cluster Industry Concentration and Competitive Advantage



While employment concentrations (higher LQ’s) and rates of employment change compared nationally indicate a strong presence of industry clusters, critical concentrations must be present in order for clusters to exist. Concentration of specific industries within a geographic area provide opportunities for collective advantages of advancing specific industry cluster success. This advantage provides the ability to acquire information, sustain supporting infrastructure, and facilitate competitive collaboration. Determining concentrations, specific industry clusters must contain five or more establishments within a specific geography to be considered a cluster.

Summary of Screening Criteria for Candidate Clusters

- **Location Quotient (LQ):** Industry concentration within the identified area with an LQ greater than 1.25
- **Competitive Advantage (DS):** Cluster competitiveness as compared to the national level of a differential shift greater than 0.
- **Critical Concentration:** Five establishments or more within the defined cluster.

CANDIDATE CLUSTER FINDINGS

Table 1 identifies Tualatin’s top economic clusters based on their location quotients. This list illustrates 13 traded clusters that are present with the addition of the *Advanced Manufacturing Supercluster* and *Healthcare Cluster* totaling 15. *Furniture* is the most concentrated cluster with an LQ of 10.79, followed by *Information Technology and Analytical Instruments* (9.99), *Advanced Manufacturing Supercluster* (5.38) and *Plastics* (5.21).

Graph 2 illustrates how each of the candidate clusters identified based on the initial screening criteria are displayed within the four quadrant criteria.

Table 1: Economic Clusters Based on Location Quotients

Rank	Cluster	Location Quotient (LQ)	Cluster Employment, 2017	Number of Establishments, 2016	Differential Shift (DS)
1	Furniture	10.79	776	6	82%
2	Information Technology and Analytical Instruments	9.99	2,270	37	23%
3	Advanced Manufacturing Supercluster	5.38	2,433	46	3%
4	Plastics	5.21	587	10	25%
5	Food Processing and Manufacturing	2.73	564	6	142%
6	Distribution and Electronic Commerce	2.08	2,535	193	23%
7	Construction Products and Services	1.96	331	7	0%
8	Printing Services	1.26	110	11	-11%
9	Business Services	0.96	2,506	131	55%
10	Marketing, Design, and Publishing	0.93	385	28	-8%
11	Transportation and Logistics	0.88	378	16	31%
12	Healthcare	0.82	3,279	153	-20%
13	Hospitality and Tourism	0.22	144	8	4%
14	Financial Services	0.17	141	35	-4%
15	Education and Knowledge Creation	0.16	199	16	-30%

Source: EMSI, QECW Oregon Department of Employment, 2016

Graph 2: Industry Concentration and Competitive Advantage (Refer to Graph 1 for Characteristics)

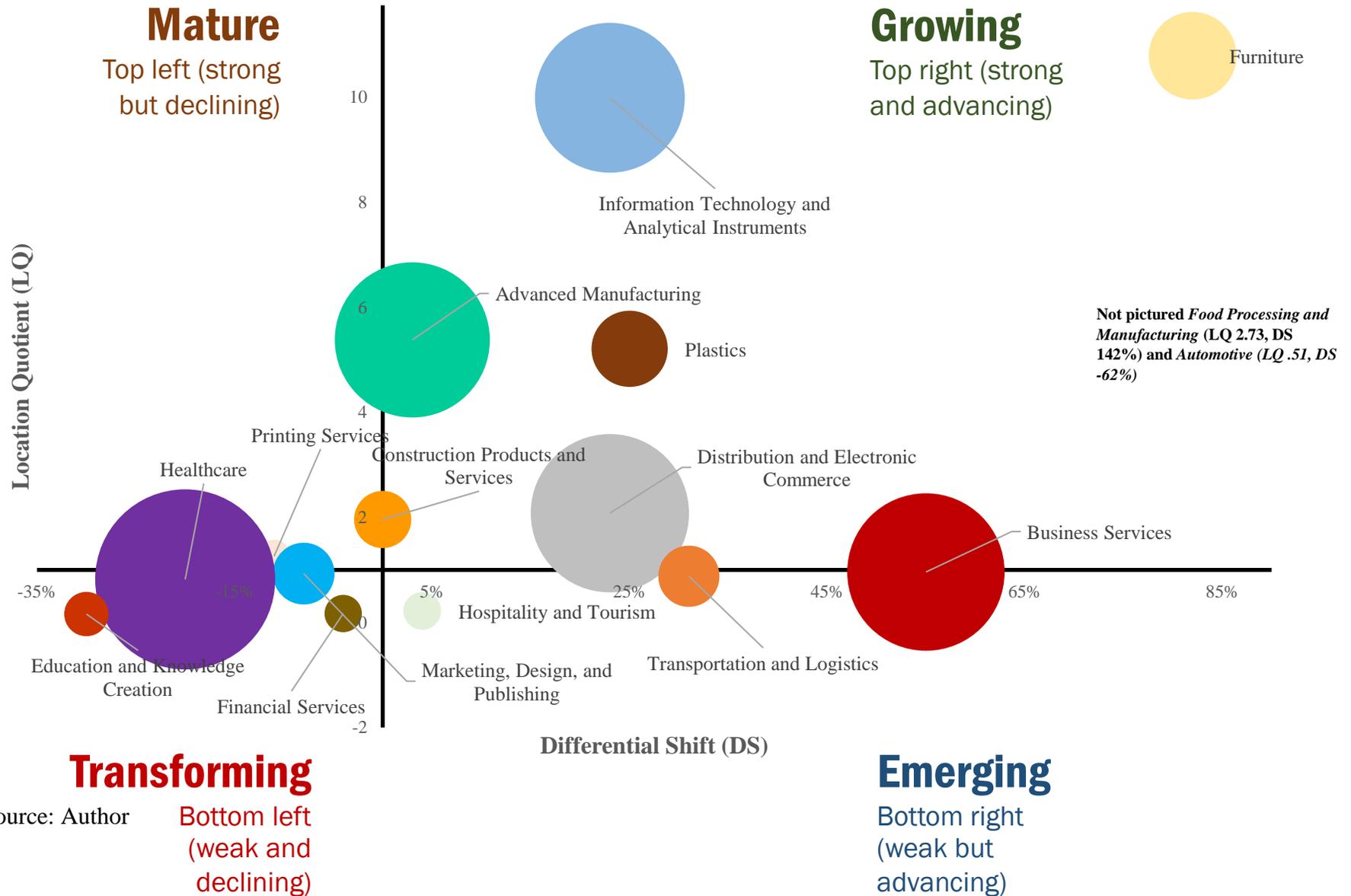


Table 2: Cluster Ranking Based on Differential Shift and Location Quotient Quadrant

Rank	Cluster	Location Quotient (LQ)	Cluster Employment, 2017	Number of Establishments, 2016	Differential Shift (DS)
GROWING BASE					
1	Food Processing and Manufacturing	2.73	564	6	142%
2	Furniture	10.79	776	6	82%
3	Plastics	5.21	587	10	25%
4	Information Technology and Analytical Instruments	9.99	2,270	37	23%
5	Distribution and Electronic Commerce	2.08	2,535	193	23%
6	Advanced Manufacturing	5.38	2,433	46	3%
EMERGING CLUSTERS					
7	Business Services	0.96	2,506	131	55%
8	Transportation and Logistics	0.88	378	16	31%
9	Hospitality and Tourism	0.22	144	8	4%
MATURE CLUSTERS					
10	Construction Products and Services	1.96	331	7	-0.4%
11	Printing Services	1.26	110	11	-11%
TRANSFORMATION CLUSTERS					
12	Financial Services	0.17	141	35	-4%
13	Marketing, Design, and Publishing	0.93	385	28	-8%
14	Healthcare	0.82	3,279	153	-20%
15	Education and Knowledge Creation	0.16	199	16	-30%

Source: EMSI, 2018

IDENTIFIED CLUSTERS OF TUALATIN, OREGON

This analysis has identified seven potential industrial clusters in Tualatin, Oregon with strong concentration (location quotient or LQ) and/or strong relative employment growth (differential shift or DS) with required establishment concentrations. Many of the identified clusters are well-known in the area, such as *Food Processing and Manufacturing*, *Information Technology and Analytical Systems*, *Business Services*, and *Advanced Manufacturing*. Together, the clusters identified employ 35% of the total workforce and pay a widely varying levels of average wages, from \$38,911 (*Furniture*) to \$109,832 (*Information Technology and Analytical Instruments*). Most industries within these identified clusters export all or most of their products or services out of the region.

Table 3. Candidate Industry Clusters Summary

The clusters that have passed the initial screening criteria are:

1. Food Processing and Manufacturing
2. Furniture
3. Plastics
4. Information Technology and Analytical Systems
5. Distribution and Electronic Commerce
6. Advanced Manufacturing Supercluster
7. Business Services

STRENGTH OF CLUSTERS

Although Table 2 and Table 3 identify the region's most concentrated competitive clusters, they still don't reveal which clusters are vital to the local economy. For example, a small cluster with a high location quotient may be an export-oriented cluster, but, relatively few jobs, is not vital to the region's economy. Likewise, a large cluster with a declining location quotient might have significant negative consequences for the regional economy. An additional analysis combining cluster sizes and locations quotients, with basic employment, national wage comparisons and wage growth, and projected employment will yield a more relevant picture of the regional economy.

Basic Employment

Basic employment references jobs and their related functions that are dedicated to producing goods or services for export outside the local community. Basic jobs are calculated by multiplying the number of jobs in a cluster by the portion of the location quotient that is above 1.00. This method captures a rather broad set of basic jobs because it uses the threshold of 1.0 instead of 1.25.

$$Ie^{RY} - \left(\frac{Ie^{RY}}{IeLQ^{RY}} \right)$$

Ie^{RY} = Industry employment in referenced year

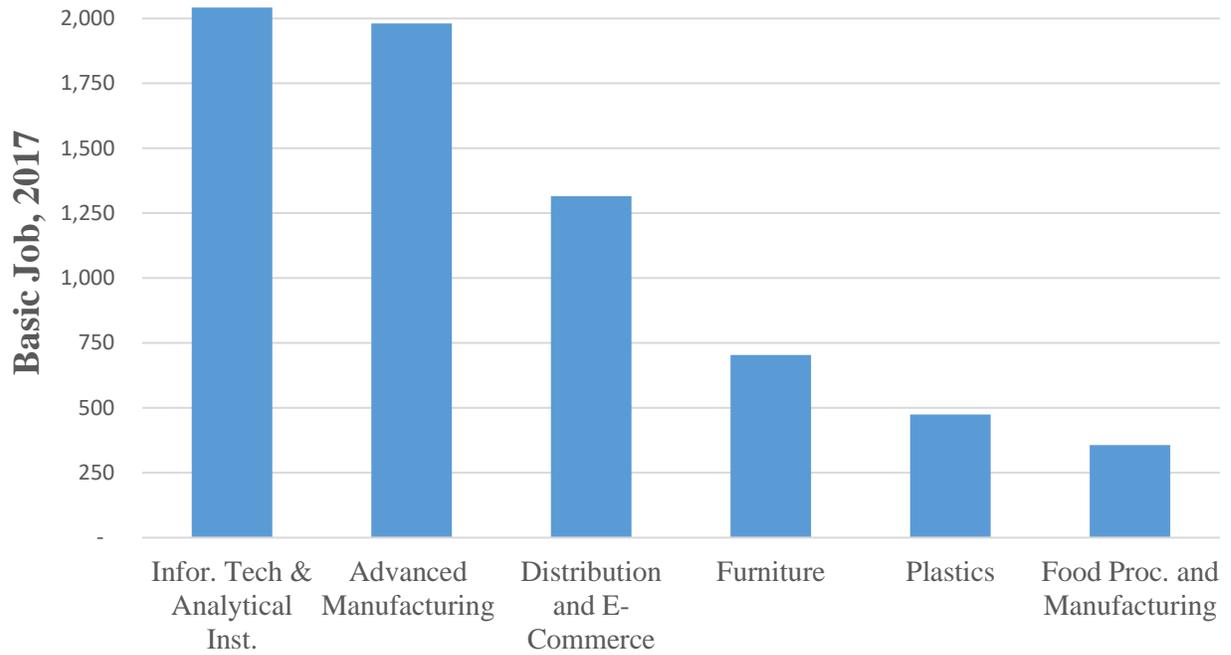
$IeLQ^{RY}$ = Location Quotient of industry in referenced year.

Table 4. Candidate Clusters Ranked by Basic Jobs, 2017

Rank	Cluster	2017			2012			Absolute Change 2012-2017		Percent Change 2012-2017	
		Total Jobs	Location Quotient	Basic Jobs	Total Jobs	Location Quotient	Basic Jobs	Total Jobs	Basic Jobs	Total Jobs	Basic Jobs
1	Information Technology/Analytical Instruments	2,270	9.99	2,043	1,705	9.42	1,524	565	519	33%	34%
2	Advanced Manufacturing	2,523	4.02	1,896	2,496	4.80	1,976	27	-1,976	1%	-4%
3	Distribution and Electronic Commerce	2,535	2.08	1,316	1,801	2.00	899	734	417	41%	46%
4	Furniture	776	10.79	704	396	7.17	340	380	364	96%	107%
5	Plastics	587	5.21	474	428	4.88	340	159	134	37%	39%
6	Food Processing and Manufacturing	564	2.73	357	218	1.40	63	346	294	159%	467%
7	Business Services	2,506	0.96	0	1,251	0.79	0	1,255	0	100%	0%

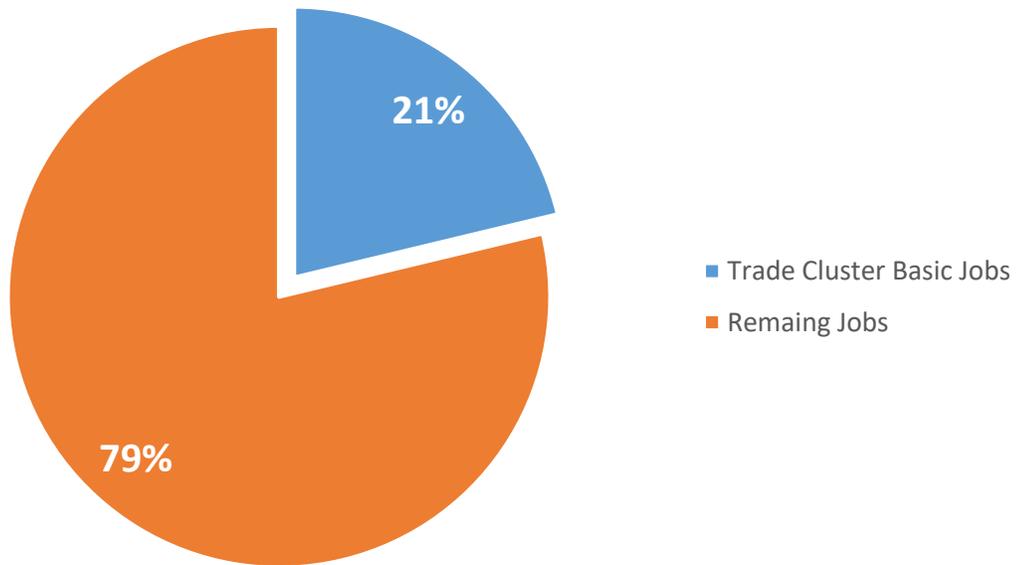
Source: EMSI, 2018

Graph 3. Top Basic Jobs Cluster, 2017



Source: Author

Graph 4. Top Basic Jobs Cluster, 2017



Source: EMSI

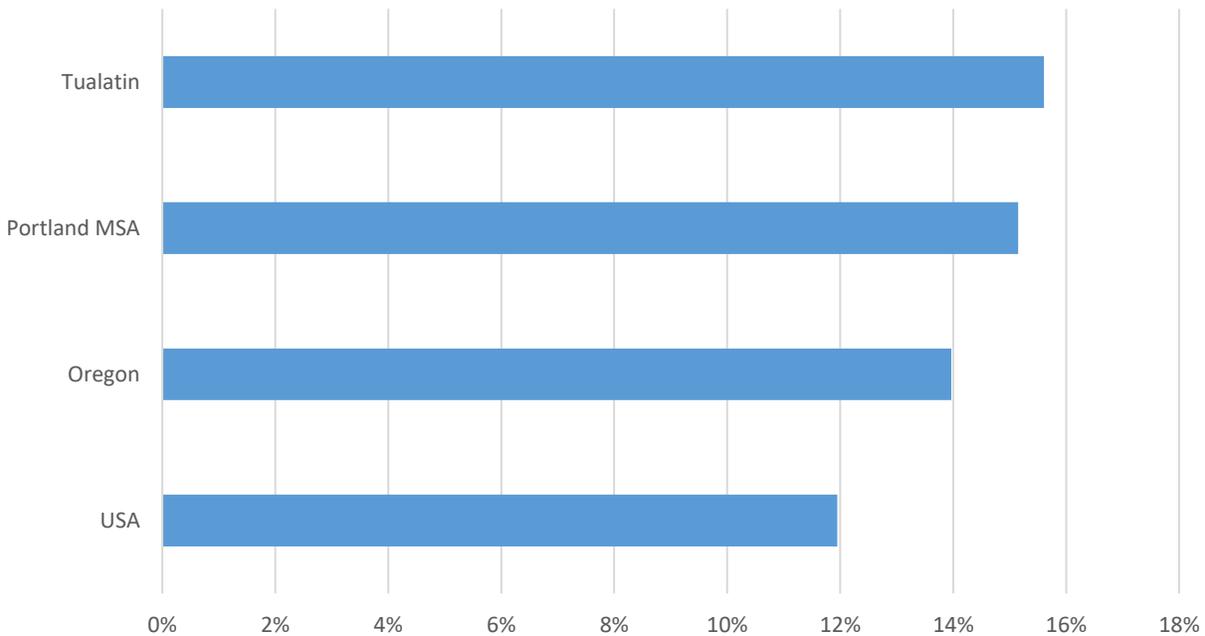
Tualatin’s identified candidate traded clusters basic jobs account for nearly 21% of total employment with 6,875 jobs dedicated to export oriented functions. *Information Technology and Analytical Instruments* is ranked number one with 2,043 basic jobs, followed by *Advanced Manufacturing* (1,981) and *Distribution and Electronic Commerce* (1,316). Of the 7 identified clusters, *Business Services* does not provide any basic employment.

Projected Employment

Location Quotient and comparative advantage provides an opportunity to look at current and comparative time growth for specific industry clusters within a given region. Understanding past, current, and future economic projections can assist communities with identifying opportunities or threats to the regional economy and allow a tailored approach to utilizing land-use and resources for long-term economic planning. Industry clusters that are present within the region that are projected to have long term employment growth are given priority in this analysis.

Total projected employment growth for the City of Tualatin is estimated to be a 15.6% increase from 33,466 jobs to 38,689. This is a faster rate of growth than th Portland MSA (15.1%), the State of Oregon (14.0%) and the United States (11.9%).

Graph 5. Total Projected Employment Growth, 2028



Source: EMSI

Business Services is projected to have the largest numerical job growth with 877 new jobs by 2028, followed by *Distribution and E-Commerce* with 665 jobs, and *Food Processing and Manufacturing* with 359 jobs. *Food Processing and Manufacturing* is also projected to be the

fastest growing cluster with 64% growth. *Information Technology and Analytical Instruments* will lose 279 jobs equating to a 12% job loss.

Table 5. Ranked Industry Clusters Based on Projected Total Change in Jobs, 2028

Rank	Cluster	Tualatin			USA	
		2028		2017	2028	
		Total Jobs	Projected Change	Projected Job Gains	Total Jobs	Total Jobs
1	Business Services	3,383	35%	877	2,506	15,370,142
2	Distribution and Electronic Commerce	3,200	26%	665	2,535	8,209,894
3	Food Processing and Manufacturing	923	64%	359	564	1,296,576
4	Furniture	921	19%	145	776	426,529
5	Advanced Manufacturing	2,527	4%	94	2,433	3,654,497
6	Plastics	593	1%	6	587	633,467
7	Information Technology and Analytical Instruments	1,991	-12%	-279	2,270	1,410,836

Source: EMSI

Wage Comparison

Specialized industries that have higher levels of productivity are likely to pay higher wages than their less competitive counterparts. In tandem, industries that are regionally and nationally competitive may show lower concentrations of employment but have higher wage earnings – potentially reflecting employee’s elevated skill set or additional access to capital that may increase productivity. Determining the threshold, the average wage of an identified industry within a region is compared with the average wages nationally. Since the overall wage of Tualatin, Oregon is 120% of the overall national average, this screening criteria is set at 80%.

Wage Growth and Competitiveness

Wage growth and competitiveness is the final strength metric in our wages analysis. Jobs that have industry wage growth that exceeds the national average provides better opportunities for job retention and industry recruitment.

Table 6. Candidate Clusters Ranked By Wage, 2017

Rank	Cluster	Tualatin, Oregon				United States
		Wages, 2017	Wage Comparison 2017	% Change, Wages	Wage Competitiveness	Wages, 2017
1	Information Technology and Analytical Instruments	\$ 109,832	87%	4%	-17%	\$ 126,356
2	Business Services	\$ 95,867	126%	53%	45%	\$ 76,311
3	Distribution and Electronic Commerce	\$ 70,560	106%	7%	2%	\$ 66,360
4	Advanced Manufacturing	\$ 53,599	86%	3%	-5%	\$ 62,420
5	Food Processing and Manufacturing	\$ 53,218	99%	40%	33%	\$ 54,014
6	Plastics	\$ 50,794	91%	14%	3%	\$ 55,877
7	Furniture	\$ 38,911	91%	6%	-7%	\$ 42,881

Source: EMSI

Table 4 displays the seven traded industry clusters ranked by 2017 annual wage. Again, *Information Technology and Analytical Instruments* cluster ranks number one with the annual wage of \$109,832, followed by *Business Services* at \$95,867, and *Distribution and E-Commerce* at \$70,560. *Furniture* cluster provides the lowest annual wage with \$38,911.

Comparatively, all identified traded industry clusters are far above the 80% national comparative wage level.

The average annual wage for Tualatin in 2017 was \$57,786, an increase of 20% since 2012. Nationally, the 2017 average was \$48,326 with a wage growth rate near 11%. All traded industry clusters had positive wage growth since 2012. *Business Services* had the highest wage growth of 53%, followed by *Food Processing and Manufacturing* (40%) and *Plastics* (14%). While all traded industries had positive wage growth since 2012, three have grown slower than their respective national cluster average. *Information Technology* grew 17% slower rate than the its national average, *Furniture* at a 5%, and *Advanced Manufacturing* at 3%.

Summary

The City of Tualatin should development policies, plans and objectives to adequately foster economic development across all industries. Primary focus should be placed on the identified Growing Base and Emerging Clusters to foster business development and employment opportunities for export oriented production.

In addition, long-range planning should adequately incorporate anticipated growth and development in these clusters. Beneficial land-use regulations, transportation planning and funding, proximity residential development, and planned utility usage will play major factors in creating a positive, nurturing environment cluster creation and growth.

The following definitions for identified industry clusters are provide: Delgado, M., M.E. Porter, and S. Stern (2014), "Defining Clusters of Related Industries.

Legend:

D*** - undisclosed.

TABLE 7. Cluster Indicator Ranges and Quadrant Strength Values

Relative Employment Concentration		Relative Employment Growth	
LQ RANGE	LQ STRENGTH	DS RANGE	DS STRENGTH
<.25	LQ ----	<.50	DS ---
.25 - .50	LQ ---	-20% - -50%	DS --
.51 - .75	LQ --	-20% - -5%	DS -
.76 – 1.10	LQ 1	-4% - 5%	DS 0
1.11 – 1.75	LQ +	6% - 10 %	DS +
1.76 – 3.00	LQ ++	11% - 25%	DS ++
>3.00	LQ +++	>26%	DS +++

Food Processing and Manufacturing Cluster

This cluster includes firms involved in the processing of raw food materials and the manufacturing of downstream food products for end users. This includes millers and refineries of rice, flour, corn, sugar, and oilseeds. These upstream products contribute in part to producing specialty foods, animal foods, baked goods, candies, teas, coffees, beers, wines, other beverages, meats, packaged fruits and vegetables, and processed dairy products.

Table 7. Key Characteristics of the Food Processing and Manufacturing Cluster

NAICS Code	Description	Quadrant Location	Quadrant Strength	Employment	Ave. Wage/yr.
311813	Frozen Cakes, Pies, and Other Pastries Manufacturing	D***	D***	D***	D***
311911	Roasted Nuts and Peanut Butter Manufacturing	D***	D***	D***	D***
311919	Other Snack Food Manufacturing	D***	D***	D***	D***
311942	Spice and Extract Manufacturing	D***	D***	D***	D***
311422	Specialty Canning	Star	LQ+++ DS+++	209	\$ 62,100.00
311423	Dried and Dehydrated Food Manufacturing	Star	LQ+++ DS+++	183	\$ 56,000.00
311991	Perishable Prepared Food Manufacturing	Mature	LQ+++ DS-	84	\$ 38,940.89
312130	Wineries	Star	LQ+++ DS+	42	\$ 38,439.80
311930	Flavoring Syrup and Concentrate Manufacturing			22	\$ 34,558.05
311941	Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing	Mature	LQ+++ DS--	16	\$ 46,318.69
	TOTAL			564	\$ 53,217.51

Source: EMSI, 2018

Business Services Cluster

Firms in this cluster include establishments and services primarily designed to support other aspects of a business or to assist unrelated companies. This includes corporate headquarters. Professional services such as consulting, legal services, facilities support services, computer services, engineering and architectural services, and placement services. All for-hire ground passenger transportation services are also present in this cluster.

Table 8. Key Characteristics of the Business Services Cluster

NAICS Code	Business Services Industry Cluster (6-Digit)	Quadrant Location	Quadrant Strength	Employment	Avg. Wage/yr.
485999	All Other Transit and Ground Passenger Transportation			34	\$ 18,299
518210	Data Processing, Hosting, and Related Services	Transforming	LQ--- DS-	22	\$ 90,569
532112	Passenger Car Leasing			D***	D***
533110	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	Growing Base	LQ+++ DS++	27	\$ 81,914
541214	Payroll Services			D***	D***
541330	Engineering Services	Growing Base	LQ1 DS+++	150	\$ 76,403
541340	Drafting Services			D***	D***
541511	Custom Computer Programming Services	Growing Base	LQ1 DS++	198	\$ 70,853
541512	Computer Systems Design Services	Transforming	LQ1 DS--	176	\$ 84,333
541519	Other Computer Related Services			D***	D***
541611	Administrative Management and General Management Consulting Services	Transforming	LQ-- DS--	127	\$ 45,513
541612	Human Resources Consulting Services	Growing Base	LQ++ DS++	41	\$ 55,541
541690	Other Scientific and Technical Consulting Services	Growing Base	LQ1 DS+++	63	\$ 66,682
541990	All Other Professional, Scientific, and Technical Services	Transforming	LQ-- DS-	154	\$ 34,393
551111	Offices of Bank Holding Companies			0	0
551112	Offices of Other Holding Companies	Growing Base	LQ++ DS+++	35	\$ 111,753
551114	Corporate, Subsidiary, and Regional Managing Offices	Growing Base	LQ++ DS+++	937	\$ 170,830
561311	Employment Placement Agencies	Growing Base	LQ+++ DS+++	452	\$ 20,333
561330	Professional Employer Organizations	Transforming	LQ-- DS -	39	\$ 36,450
561422	Telemarketing Bureaus and Other Contact Centers	Transforming	LQ--- DS---	24	\$ 54,452
561920	Convention and Trade Show Organizers			D***	D***
	TOTAL			2,506	\$ 95,867

Information Technology and Analytical Systems

This cluster consists of information technology and analytical products such as computers, software, audio visual equipment, laboratory instruments, and medical apparatus. The cluster also includes the standard and precision electronics used by these products (for example, circuit boards and semiconductor devices).

Table 9. Key Characteristics of the Information Technology and Analytical Systems Cluster

NAICS Code	Information Technology and Analytical Systems Cluster (6-Digit)	Quadrant Location	Cluster Strength	Employment	Avg. Wage/yr
333242	Semiconductor Machinery Manufacturing	Growing Base	LQ+++ DS+++	1,232	\$ 120,978
334310	Audio and Video Equipment Manufacturing	Growing Base	LQ+++ DS++	51	\$ 82,322
334413	Semiconductor and Related Device Manufacturing	Growing Base	LQ+ DS++	45	\$ 166,593
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	Growing	LQ+++ DS+	94	\$ 61,069
334419	Other Electronic Component Manufacturing	Mature	LQ+++ DS-	372	\$ 76,740
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	Growing Base	LQ+++ DS+	379	\$ 112,943
511210	Software Publishers	Mature	LQ+ DS--	96	\$ 118,295
	TOTAL			2,270	\$ 109,832

Source: EMSI, 2018

Distribution and E-Commerce Cluster

This cluster consists primarily of traditional wholesalers as well as mail order houses and electronic merchants. The companies in this cluster mostly buy, hold, and distribute a wide range of products such as apparel, food, chemicals, gasses, minerals, farm materials, machinery, and other merchandise. The cluster also contains firms that support distribution and electronic commerce operations, including packaging, labeling, and equipment rental and leasing.

Table 10. Key Characteristics of the Distribution and E-Commerce Cluster

NAICS Code	Distribution and E-Commerce Cluster (6-Digit)	Quadrant Location	Quadrant Strength	Employment	Avg. Wage/yr
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers			D***	D***
423420	Office Equipment Merchant Wholesalers	Mature	LQ++ DS-	33	\$ 74,5612
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	Mature	LQ++ DS--	73	\$ 103,118
423460	Ophthalmic Goods Merchant Wholesalers			20	\$ 4,553
423490	Other Professional Equipment and Supplies Merchant Wholesalers	Growing Base	LQ+++ DS+++	116	\$ 55,430
423510	Metal Service Centers and Other Metal Merchant Wholesalers	Mature	LQ++ DS-	66	\$ 1,497
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	Growing Base	LQ+++ DS+++	121	\$ 69,535
423620	Household Appliances, Electric Housewares, and Consumer Electronics Merchant Wholesalers			D***	D***
423690	Other Electronic Parts and Equipment Merchant Wholesalers			D***	D***
423810	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers	Mature	LQ+++ DS-	69	\$ 3,652
423820	Farm and Garden Machinery and Equipment Merchant Wholesalers	Growing Base	LQ++ DS++	33	\$ 47,045
423830	Industrial Machinery and Equipment Merchant Wholesalers	Growing Base	LQ+++ DS+++	183	\$ 76,443
423840	Industrial Supplies Merchant Wholesalers	Growing Base	LQ+++ DS+++	252	\$ 22,806
423910	Sporting and Recreational Goods and Supplies Merchant Wholesalers	Growing Base	LQ+++ DS++	152	\$ 50,267
423920	Toy and Hobby Goods and Supplies Merchant Wholesalers	Growing Base	LQ+++ DS+++	84	\$ 25,935

424110	Printing and Writing Paper Merchant Wholesalers			13	\$ 46,824
424210	Drugs and Druggists' Sundries Merchant Wholesalers	Growing Base	LQ+++ DS++	304	\$ 105,159
424470	Meat and Meat Product Merchant Wholesalers	Growing Base	LQ++ DS+++	16	\$ 45,739
424480	Fresh Fruit and Vegetable Merchant Wholesalers	Emerging	LQ+++ DS0	107	\$ 3,411
424690	Other Chemical and Allied Products Merchant Wholesalers	Emerging	LQ1 DS+++	17	\$ 82,041
424910	Farm Supplies Merchant Wholesalers			D***	D***
424930	Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers			D***	D***
424940	Tobacco and Tobacco Product Merchant Wholesalers			D***	D***
424950	Paint, Varnish, and Supplies Merchant Wholesalers			D***	D***
424990	Other Miscellaneous Nondurable Goods Merchant Wholesalers	Mature	LQ++ DS0	74	\$ 37,997
425120	Wholesale Trade Agents and Brokers	Growing Base	LQ+ DS+	282	\$ 89,331
454110	Electronic Shopping and Mail-Order Houses	Mature	LQ1 DS-	125	\$ 2,708
493110	General Warehousing and Storage	Growing Base	LQ+ DS+++	253	\$ 20,489
493130	Farm Product Warehousing and Storage			D***	D***
493190	Other Warehousing and Storage	Growing Base	LQ++ DS+++	28	\$ 19,470
532411	Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing			D***	D***
532412	Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing	Growing Base	LQ+ DS+++	25	\$ 40,253
532420	Office Machinery and Equipment Rental and Leasing			D***	D***
532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing	Mature	LQ++ DS--	56	\$ 39,568
	TOTAL			2,535	\$ 70,560

Source: EMSI, 2018

Plastics Cluster

Establishments in this cluster manufacture plastic materials, components, and products. The plastics and foams are manufactured for packaging, pipes, floor coverings, and related plastic products. The cluster also includes the upstream manufacturing of plastic materials and resins, as well as the industrial machines used to manufacture plastics.

Table 11. Key Characteristics of the Plastics Cluster

NAICS Code	Plastics Cluster (6-Digit)	Quadrant Location	Quadrant Strength	Employment	Avg. Wage/yr
325211	Plastics Material and Resin Manufacturing			0	\$ -
326111	Plastics Bag and Pouch Manufacturing			D***	D***
326112	Plastics Packaging Film and Sheet (including Laminated) Manufacturing			D***	D***
326113	Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing			0	\$ -
326121	Unlaminated Plastics Profile Shape Manufacturing			0	\$ -
326122	Plastics Pipe and Pipe Fitting Manufacturing			D***	D***
326130	Laminated Plastics Plate, Sheet (except Packaging), and Shape Manufacturing			0	\$ -
326140	Polystyrene Foam Product Manufacturing			D***	D***
326150	Urethane and Other Foam Product (except Polystyrene) Manufacturing	Mature	LQ+++ DS--	117	\$ 50,481
326160	Plastics Bottle Manufacturing			D***	D***
326191	Plastics Plumbing Fixture Manufacturing			-	\$ -
326199	All Other Plastics Product Manufacturing	Growing Base	LQ+++ DS+++	465	\$ 50,784
339994	Broom, Brush, and Mop Manufacturing			D***	D***
	TOTAL			587	\$ 50,794

Source: EMSI, 2018

Furniture

This cluster contains establishments that manufacture furniture, cabinets, and shelving for residential homes and offices. It also includes establishments that produce manufactured homes. The products in this cluster can be made of wood, metal, plastic, and/or textiles.

Table 12. Key Characteristics of the Furniture Cluster

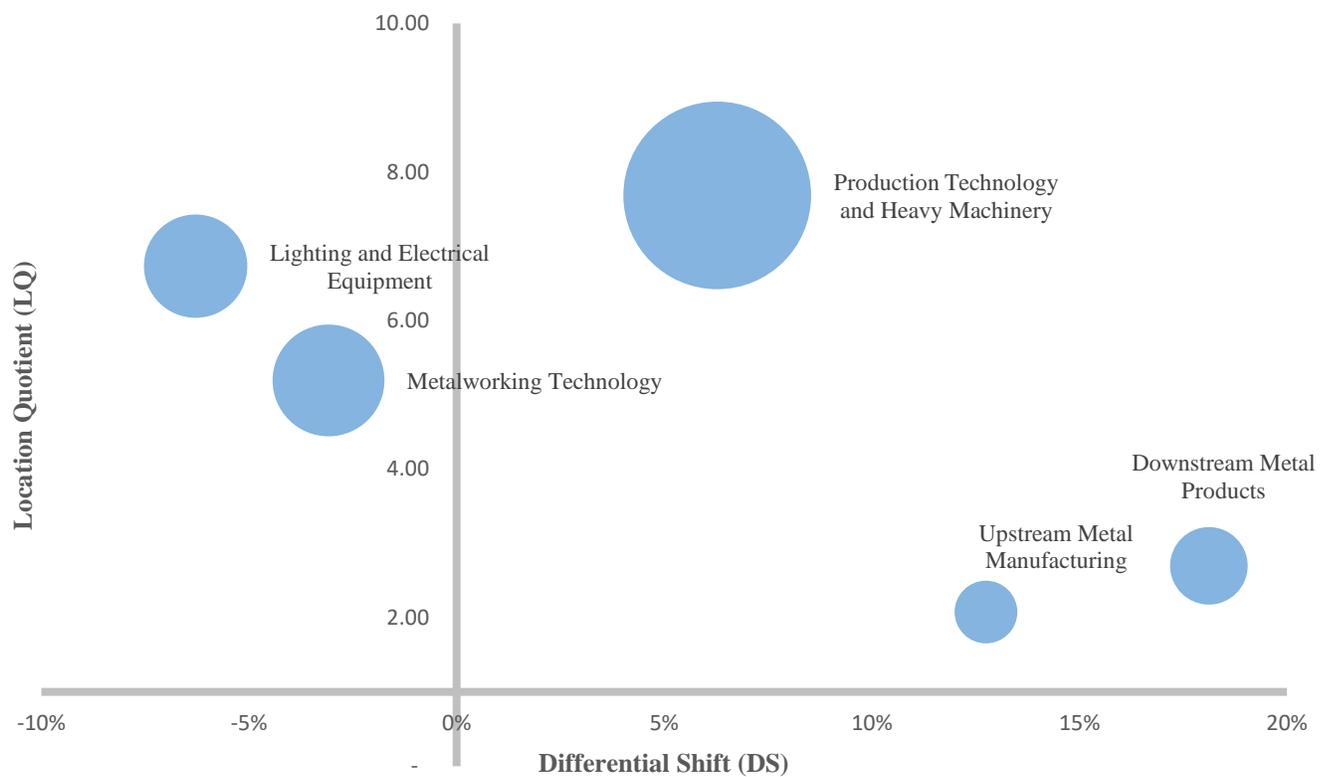
NAICS Code	Furniture Cluster (6-Digit)	Quadrant Location	Quadrant Strength	Employment	Avg. Wage/yr
37110	Wood Kitchen Cabinet and Countertop Manufacturing	Growing Base	LQ++ DS++	59	\$ 39,250
337121	Upholstered Household Furniture Manufacturing	Growing Base	LQ+++ DS+++	361	\$ 30,327
337122	Nonupholstered Wood Household Furniture Manufacturing	Growing Base	L+++ DS+++	79	\$ 37,221
337124	Metal Household Furniture Manufacturing			D***	D***
337214	Office Furniture (except Wood) Manufacturing	Growing Base	LQ+++ DS+++	183	\$ 54,934
337910	Mattress Manufacturing	Transforming	LQ+++ DS--	92	\$ 42,007
	TOTAL			776	\$ 38,911

Source: EMSI, 2018

Advanced Manufacturing Supercluster

The *Advanced Manufacturing Supercluster* is an internally preferred grouping of five independent traded clusters for a comprehensive display. *Downstream Metal Products*, *Lighting and Electrical Equipment*, *Metalworking Technology*, *Production Technology and Heavy Machinery*, and *Upstream Metal Manufacturing* comprise the *Advanced Manufacturing Supercluster*.

Graph 6: Advanced Manufacturing Supercluster Concentration and Competitive



Source: EMSI, 2018

Lighting and Electrical Equipment SubCluster

This cluster contains firms involved in the manufacture of electrical equipment and electronic components. The companies in this cluster manufacture wire for communications, wiring devices, fiber optic cables, switchboards, lighting fixtures, motors, transformers, and related products.

Table 13. Key Characteristics of the Lighting and Electrical Subcluster

NAICS Code	Lighting and Electrical Equipment Subcluster (6-Digit)	Quadrant Location	Quadrant Strength	Employment	Avg. Wage/yr.
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing			D***	D***
335314	Relay and Industrial Control Manufacturing	Transforming	LQ++ DS--	22	\$ 60,936
335931	Current-Carrying Wiring Device Manufacturing	Growing Base	LQ+++ DS0	355	\$ 68,625
	TOTAL			380	\$ 68,108

Source: EMSI, 2018

Metalworking Technology Subcluster

The establishments in this cluster manufacture machine tools and process metal for use in metal working. The cluster also contains the downstream manufacture of metal fasteners and hand tools.

Table 14. Key Characteristics of the Metalworking Technology Subcluster

NAICS Code	Metalworking Technology Subcluster (6-Digit)	Quadrant Location	Quadrant Strength	Employment	Avg. Wage/yr.
332313	Plate Work Manufacturing	Transforming	LQ+++ DS0	108	\$ 62,617
332721	Precision Turned Product Manufacturing	Transforming	LQ+++ DS--	22	\$ 58,520
332811	Metal Heat Treating			D***	D***
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	Growing Base	LQ+++ DS++	221	\$ 40,621
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	Transforming	LQ+++ DS--	63	\$ 48,346
	TOTAL			445	\$ 48,592

Source: EMSI, 2018

Production Technology and Heavy Machinery Manufacturing Subcluster

Establishments in this cluster primarily manufacture machines designed to produce parts and devices used in the production of downstream products. This cluster also includes end use heavy machinery such as air and material handling equipment. The machines are used for industrial, agricultural, construction, commercial industry, and related purposes.

Table 15. Key Characteristics of Production Technology and Heavy Machinery Manufacturing Subcluster

NAICS Code	Production Technology and Heavy Machinery Manufacturing Subcluster (6-Digit)	Quadrant Location	Quadrant Strength	Employment	Ave. Wage/yr.
333111	Farm Machinery and Equipment Manufacturing			D***	D***
333120	Construction Machinery Manufacturing	Growing Base	LQ+ DS0	15	\$ 70,676
333249	Other Industrial Machinery Manufacturing	Transforming	LQ+++ DS0	152	\$ 57,443
333413	Industrial and Commercial Fan and Blower and Air Purification Equipment Manufacturing	Growing Base	LQ+++ DS0	509	\$ 43,223
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing			D***	D***
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	Growing Base	LQ+++ DS+++	164	\$ 71,040
333611	Turbine and Turbine Generator Set Units Manufacturing			D***	D***
333912	Air and Gas Compressor Manufacturing			18	\$ 85,684
333914	Measuring, Dispensing, and Other Pumping Equipment Manufacturing	Growing Base	LQ+++ LQ++	28	\$ 49,055
333922	Conveyor and Conveying Equipment Manufacturing			D***	D***
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing	Transforming	LQ+++ DS-	283	\$ 55,803
333924	Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing	Growing Base	LQ+++ DS+++	76	\$ 61,813
333993	Packaging Machinery Manufacturing			D***	D***
333995	Fluid Power Cylinder and Actuator Manufacturing			D***	D***
	TOTAL			1,254	\$ 53,864

Source: EMSI, 2018

Upstream Metal Manufacturing Subcluster

The establishments in this cluster manufacture upstream metal products such as pipes, tubes, metal closures, wires, springs, and related products. The cluster includes iron and steel mills and foundries, as well as related metal processing techniques.

Table 16. Key Characteristics of Upstream Metal Manufacturing Subcluster

NAICS Code	Upstream Metal Manufacturing Subcluster (6-Digit)	Quadrant Location	Quadrant Strength	Employment	Avg. Wage/yr.
332111	Iron and Steel Forging	Transforming	LQ+++ DS--	24	\$ 46,355
332119	Metal Crown, Closure, and Other Metal Stamping (except Automotive)			D***	D***
332613	Spring Manufacturing			D***	D***
332618	Other Fabricated Wire Product Manufacturing	Growing Base	LQ+++ DS++	88	\$ 57,186
	TOTAL			140	\$ 52,877

Source: EMSI, 2018

Downstream Metal Products Subcluster

This cluster contains establishments that manufacture metal containers, prefabricated metal structures, and end user metal products. These end user products include ammunition, kitchenware, hardware, metal bathroom fixtures, and similar metal products used in home finishing such as doors, windows and ornamentation.

Table 17. Key Characteristics of Downstream Metal Products Subcluster

NAICS Code	Downstream Metal Products Subcluster (6-Digit)	Quadrant Location	Quadrant Strength	Employment	Avg. Wage/yr.
332215	Metal Kitchen Cookware, Utensil, Cutlery, and Flatware (except Precious) Manufacturing	Growing Base	LQ+++ DS+++	97	\$ 46,685
332216	Saw Blade and Hand tool Manufacturing	Transforming	LQ+++ DS0	65	\$ 63,437
332311	Prefabricated Metal Building and Component Manufacturing			D***	D***
332312	Fabricated Structural Metal Manufacturing			D***	D***
332323	Ornamental and Architectural Metal Work Manufacturing	Transforming	LQ+++ DS--	30.0	\$ 41,027
332992	Small Arms Ammunition Manufacturing			D***	D***
332994	Small Arms, Ordnance, and Ordnance Accessories Manufacturing			D***	D***
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing			D***	D***
	TOTAL			214	\$ 51,357

Source: EMSI, 2018